CLAIMS

What is claimed is:

1. A valve for controlling fluid flow, said valve comprising:

an inlet duct;

an outlet duct in fluid communication with said inlet duct;

a seat positioned between said inlet duct and said outlet duct;

a pressure chamber positioned in facing relation with said seat;

a closure member positioned between said pressure chamber and said seat and having a seat engaging surface facing said seat, said closure member being pivotable about an axis to bring said seat engaging surface into and out of sealing engagement with said seat to open and close said valve; and

a diaphragm sealingly positioned between said pressure chamber and said closure member and attached thereto, said diaphragm being flexible and transferring pressure from said pressure chamber onto said closure member, said closure member being pivoted into sealing engagement with said seat when said pressure chamber is pressurized, thereby closing said valve, said closure member being pivotable out of engagement with said seat when said pressure chamber is depressurized, thereby allowing said valve to open.

2. A valve according to Claim 1, wherein said seat has a non-circular shape.

3. A valve according to Claim 2, wherein said seat has an elliptical shape.

4. A valve according to Claim 3, wherein said inlet duct is substantially coaxially aligned with said outlet duct.

5. A valve according to Claim 4, wherein said seat is angularly oriented relatively to said inlet and outlet ducts.

6. A valve according to Claim 1, wherein said seat comprises a loop having an inner and an outer perimeter, a first projection extending along said inner perimeter, and a second projection extending along said outer perimeter, both of said projections facing said valve closure member for sealing engagement therewith upon pivoting of said valve closure member, said first and second projections being in spaced apart relation to each other and defining a space between them.

7. A valve according to Claim 6, wherein said loop is comprised of a flexible, resilient material.

8. A valve according to Claim 6, wherein said seat engaging surface comprises a flexible, resilient substrate mounted on said valve closure member, said substrate being aligned with said first and second projections for sealing engagement therewith upon pivoting of said closure member toward said seat.

9. A valve according to Claim 6, further comprising an aperture extending through said seat and

providing fluid communication between said space and a region external to said valve.

10. A valve according to Claim 9, wherein said aperture is vented to the ambient.

11. A valve according to Claim 1, wherein said seat engaging surface comprises a loop mounted on said valve closure member, said loop having an inner and an outer perimeter, a first projection extending along said inner perimeter, and a second projection extending along said outer perimeter, both of said projections facing said seat for sealing engagement therewith upon pivoting of said valve closure member, said first and second projections being in spaced apart relation to each other and defining a space between them.

12. A valve according to Claim 11, wherein said loop is comprised of a flexible, resilient material.

13. A valve according to Claim 11, further comprising a flexible, resilient substrate mounted on said seat, said substrate being aligned with said first and second projections for sealing engagement therewith upon pivoting of said closure member toward said seat.

14. A valve according to Claim 11, further comprising an aperture extending through said seat and providing fluid communication between said space and a region external to said valve when said seat engaging surface engages said seat.

15. A valve according to Claim 14, wherein said aperture is vented to the ambient.

16. A valve for controlling fluid flow, said valve comprising:

an inlet duct;

an outlet duct in fluid communication with said inlet duct;

a seat positioned between said inlet duct and said outlet duct;

a closure member positioned between said inlet duct and said outlet duct and having a seat engaging surface facing said seat, said closure member being pivotable about an axis to bring said seat engaging surface into and out of sealing engagement with said seat to open and close said valve; and

a loop mounted on one of said seat and said valve closure member, said loop having an inner and an outer perimeter, a first projection extending along said inner perimeter, and a second projection extending along said outer perimeter, both of said projections facing the other of said seat and said valve closure member for sealing engagement therewith upon pivoting of said valve closure member, said first and second projections being in spaced apart relation to each other and defining a space between them.

17. A valve according to Claim 16, wherein said loop is mounted on said seat.

18. A valve according to Claim 17, wherein said loop comprises a flexible, resilient material.

19. A valve according to Claim 17, further comprising a flexible, resilient substrate mounted on said valve closure member, said substrate being aligned with said first and second projections for sealing

engagement therewith upon pivoting of said closure member toward said seat.

20. A valve according to Claim 16, wherein said loop is mounted on said closure member.

21. A valve according to Claim 20, wherein said loop comprises a flexible, resilient material.

22. A valve according to Claim 20, further comprising a flexible, resilient substrate mounted on said seat, said substrate being aligned with said first and second projections for sealing engagement therewith upon pivoting of said closure member toward said seat.

23. A valve according to Claim 16, wherein said seat has a non-circular shape.

24. A valve according to Claim 23, wherein said seat has an elliptical shape.

25. A valve according to Claim 24, wherein said inlet duct is substantially coaxially aligned with said outlet duct.

26. A valve according to Claim 24, wherein said seat is angularly oriented relatively to said inlet and outlet ducts.

27. A valve according to Claim 16, further comprising an aperture extending through said seat and providing fluid communication between said space and a region external to said valve when said seat engaging surface engages said seat.

28. A valve according to Claim 27, wherein said aperture is vented to the ambient.

29. A valve according to Claim 16, further comprising:

a pressure chamber positioned adjacent to said closure member; and

a diaphragm sealingly positioned between said pressure chamber and said closure member and attached thereto, said diaphragm being flexible and transferring pressure from said pressure chamber onto said closure member, said closure member being pivoted into sealing engagement with said seat when said pressure chamber is pressurized, thereby closing said valve, said closure member being pivotable out of engagement with said seat when said pressure chamber is depressurized, thereby allowing said valve to open.

30. A sprinkler system for fire suppression, said system comprising:

a source of pressurized water;

a plurality of sprinkler heads for distributing said water;

a piping network providing fluid communication between said source of pressurized water and said sprinkler heads;

a first valve connected in said piping network between said source of pressurized water and said sprinkler heads, said first valve comprising:

an inlet duct connected to said piping network;

an outlet duct connected to said piping network, said outlet duct being in fluid communication with said inlet duct;

a seat positioned between said inlet duct and said outlet duct;

a pressure chamber positioned in facing relation with said seat;

a first conduit providing fluid communication between said source of pressurized water and said pressure chamber;

a second conduit providing fluid communication between said pressure chamber and the ambient;

a closure member positioned between said pressure chamber and said seat and having a seat engaging surface facing said seat, said closure member being pivotable about an axis to bring said seat engaging surface into and out of sealing engagement with said seat to open and close said valve;

a diaphragm sealingly positioned between said pressure chamber and said closure member and attached thereto, said diaphragm being flexible and transferring pressure from said pressure chamber onto said closure member, said closure member being pivoted into sealing engagement with said seat when said pressure chamber is pressurized, thereby closing said valve, said closure member being pivotable out of engagement with said seat when said pressure chamber is depressurized, thereby allowing said valve to open; and

a second valve positioned in said second conduit and regulating the flow of water from said pressure chamber to the ambient to open and close said valve.

31. A sprinkler system according to Claim 30, wherein said seat has a non-circular shape.

32. A sprinkler system according to Claim 31, wherein said seat has an elliptical shape.

33. A sprinkler system according to Claim 32, wherein said inlet duct is substantially coaxially aligned with said outlet duct.

34. A sprinkler system according to Claim 33, wherein said seat is angularly oriented relatively to said inlet and outlet ducts.

35. A sprinkler system according to Claim 30, wherein said seat comprises a loop having an inner and an outer perimeter, a first projection extending along said inner perimeter, and a second projection extending along said outer perimeter, both of said projections facing said valve closure member for sealing engagement therewith upon pivoting of said valve closure member, said first and second projections being in spaced apart relation to each other and defining a space between them.

36. A sprinkler system according to Claim 35, wherein said loop is comprised of a flexible, resilient material.

37. A sprinkler system according to Claim 35, wherein said seat engaging surface comprises a flexible, resilient substrate mounted on said valve closure member, said substrate being aligned with said first and second projections for sealing engagement therewith upon pivoting of said closure member toward said seat.

38. A sprinkler system according to Claim 35, further comprising an aperture extending through said seat and providing fluid communication between said space and a region external to said valve.

39. A sprinkler system according to Claim 38, wherein said aperture is vented to the ambient.

40. A sprinkler system according to Claim 38, further comprising an alarm in fluid communication with said aperture, said alarm being triggered by flow of said water through said aperture upon opening of said first valve.

41. A sprinkler system according to Claim 30, wherein said seat engaging surface comprises a loop mounted on said valve closure member, said loop having an inner and an outer perimeter, a first projection extending along said inner perimeter, and a second projection extending along said outer perimeter, both of said projections facing said seat for sealing engagement therewith upon pivoting of said valve closure member, said first and second projections being in spaced apart relation to each other and defining a space between them.

42. A sprinkler system according to Claim 41, wherein said loop is comprised of a flexible, resilient material.

43. A sprinkler system according to Claim 41, further comprising a flexible, resilient substrate mounted on said seat, said substrate being aligned with said first and second projections for sealing

engagement therewith upon pivoting of said closure member toward said seat.

44. A sprinkler system according to Claim 41, further comprising an aperture extending through said seat and providing fluid communication between said space and a region external to said valve when said seat engaging surface engages said seat.

45. A sprinkler system according to Claim 44, wherein said aperture is vented to the ambient.

46. A sprinkler system according to Claim 44, further comprising an alarm in fluid communication with said aperture, said alarm being triggered by flow of said water through said aperture upon opening of said first valve.

47. An asymmetric rolling diaphragm forming a seal between a first and a second part movable relatively to one another, said rolling diaphragm comprising a flexible, resilient membrane having a perimeter attached to said first part and a central portion attached to said second part, a region of said membrane between said perimeter and said central portion forming a loop positioned between said first and second parts, said loop having a length that varies as a function of position around said membrane.

48. An asymmetric rolling diaphragm according to Claim 47, wherein said second part is pivotally movable relatively to said first part about a pivot axis, said loop length being greatest at a point on said membrane distal to said pivot axis.